

# BF991

## N-channel dual-gate MOS-FET

Rev. 03 — 20 November 2007

Product data sheet

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NXP Semiconductors

# N-channel dual-gate MOS-FET

**BF991**

## FEATURES

- Protected against excessive input voltage surges by integrated back-to-back diodes between gates and source.

## APPLICATIONS

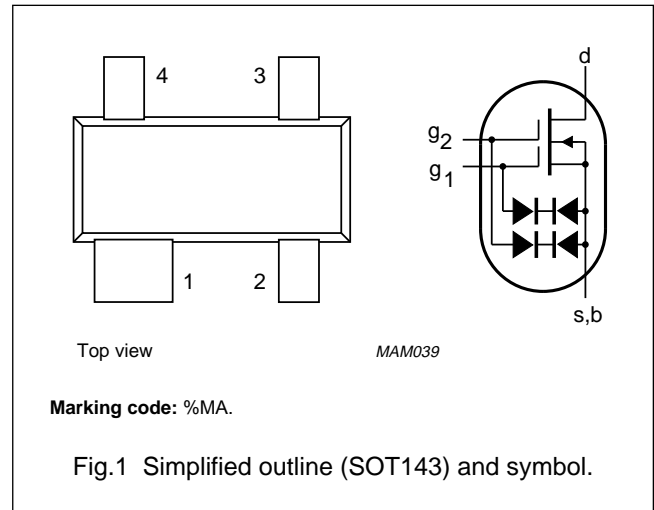
- VHF applications such as:
  - VHF television tuners and FM tuners
  - Professional communication equipment.

## PINNING

PIN	SYMBOL	DESCRIPTION
1	s, b	source
2	d	drain
3	g <sub>2</sub>	gate 2
4	g <sub>1</sub>	gate 1

## DESCRIPTION

Depletion type field-effect transistor in a plastic SOT143 microminiature package with interconnected source and substrate.



## QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
V <sub>DS</sub>	drain-source voltage		–	20	V
I <sub>D</sub>	drain current		–	20	mA
P <sub>tot</sub>	total power dissipation	up to T <sub>amb</sub> = 60 °C	–	200	mW
T <sub>j</sub>	junction temperature		–	150	°C
Y <sub>fs</sub>	transfer admittance	f = 1 kHz; I <sub>D</sub> = 10 mA; V <sub>DS</sub> = 10 V; V <sub>G2-S</sub> = 4 V	14	–	mS
C <sub>ig1-s</sub>	input capacitance at gate 1	f = 1 MHz; I <sub>D</sub> = 10 mA; V <sub>DS</sub> = 10 V; V <sub>G2-S</sub> = 4 V	2.1	–	pF
C <sub>rs</sub>	feedback capacitance	f = 1 MHz; I <sub>D</sub> = 10 mA; V <sub>DS</sub> = 10 V; V <sub>G2-S</sub> = 4 V	20	–	fF
F	noise figure	f = 200 MHz; G <sub>S</sub> = 2 mS; B <sub>S</sub> = B <sub>Sopt</sub> ; I <sub>D</sub> = 10 mA; V <sub>DS</sub> = 10 V; V <sub>G2-S</sub> = 4 V	1	2	dB

# N-channel dual-gate MOS-FET

BF991

## LIMITING VALUES

In according with the Absolute Maximum Rating System (IEC 134).

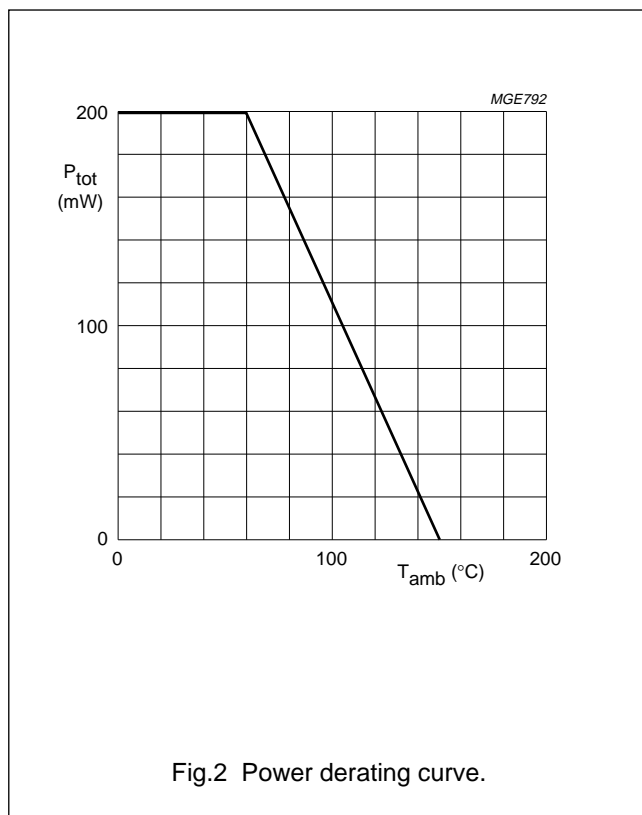
SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{DS}$	drain-source voltage		–	20	V
$I_D$	drain current (DC)		–	20	mA
$I_{D(AV)}$	average drain current		–	20	mA
$I_{G1-S}$	gate 1-source current		–	±10	mA
$I_{G2-S}$	gate 2-source current		–	±10	mA
$P_{tot}$	total power dissipation	up to $T_{amb} = 60\text{ °C}$ ; note 1	–	200	mW
$T_{stg}$	storage temperature		–65	+150	°C
$T_j$	junction temperature		–	150	°C

## THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j-a}$	thermal resistance from junction to ambient	in free air; note 1	460	K/W

### Note to the Limiting values and the Thermal characteristics

1. Device mounted on a ceramic substrate of  $8 \times 10 \times 0.7\text{ mm}$ .



## N-channel dual-gate MOS-FET

BF991

## STATIC CHARACTERISTICS

 $T_j = 25\text{ }^\circ\text{C}$  unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$I_{G1-SS}$	gate 1 cut-off current	$V_{G1-S} = 5\text{ V}; V_{G2-S} = V_{DS} = 0$	–	50	nA
$I_{G2-SS}$	gate 2 cut-off current	$V_{G2-S} = 5\text{ V}; V_{G1-S} = V_{DS} = 0$	–	50	nA
$I_{DSS}$	drain current	$V_{DS} = 10\text{ V}; V_{G1-S} = 0; V_{G2-S} = 4\text{ V}$	4	25	mA
$V_{(BR)G1-SS}$	gate 1-source breakdown voltage	$I_{G1-SS} = 10\text{ mA}; V_{G2-S} = V_{DS} = 0$	6	20	V
$V_{(BR)G2-SS}$	gate 2-source breakdown voltage	$I_{G2-SS} = 10\text{ mA}; V_{G1-S} = V_{DS} = 0$	6	20	V
$V_{(P)G1-S}$	gate 1-source cut-off voltage	$I_D = 20\text{ }\mu\text{A}; V_{DS} = 10\text{ V}; V_{G2-S} = 4\text{ V}$	–	–2.5	V
$V_{(P)G2-S}$	gate 2-source cut-off voltage	$I_D = 20\text{ }\mu\text{A}; V_{DS} = 10\text{ V}; V_{G1-S} = 0$	–	–2.5	V

## DYNAMIC CHARACTERISTICS

Measuring conditions (common source):  $I_D = 10\text{ mA}; V_{DS} = 10\text{ V}; V_{G2-S} = 4\text{ V}; T_{amb} = 25\text{ }^\circ\text{C}$ .

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$ Y_{fs} $	transfer admittance	$f = 1\text{ kHz}$	10	14	–	mS
$C_{ig1-s}$	input capacitance at gate 1	$f = 1\text{ MHz}$	–	2.1	–	pF
$C_{ig2-s}$	input capacitance at gate 2	$f = 1\text{ MHz}$	–	1	–	pF
$C_{rs}$	feedback capacitance	$f = 1\text{ MHz}$	–	20	–	fF
$C_{os}$	output capacitance	$f = 1\text{ MHz}$	–	1.1	–	pF
F	noise figure	$f = 100\text{ MHz}; G_S = 1\text{ mS}; B_S = B_{Sopt}$	–	0.7	1.7	dB
		$f = 200\text{ MHz}; G_S = 2\text{ mS}; B_S = B_{Sopt}$	–	1	2	dB
$G_{tr}$	transducer gain; note 1	$f = 100\text{ MHz}; G_S = 1\text{ mS}; B_S = B_{Sopt}; G_L = 0.5\text{ mS}; B_L = B_{Lopt}$	–	29	–	dB
		$f = 200\text{ MHz}; G_S = 2\text{ mS}; B_S = B_{Sopt}; G_L = 0.5\text{ mS}; B_L = B_{Lopt}$	–	26	–	dB

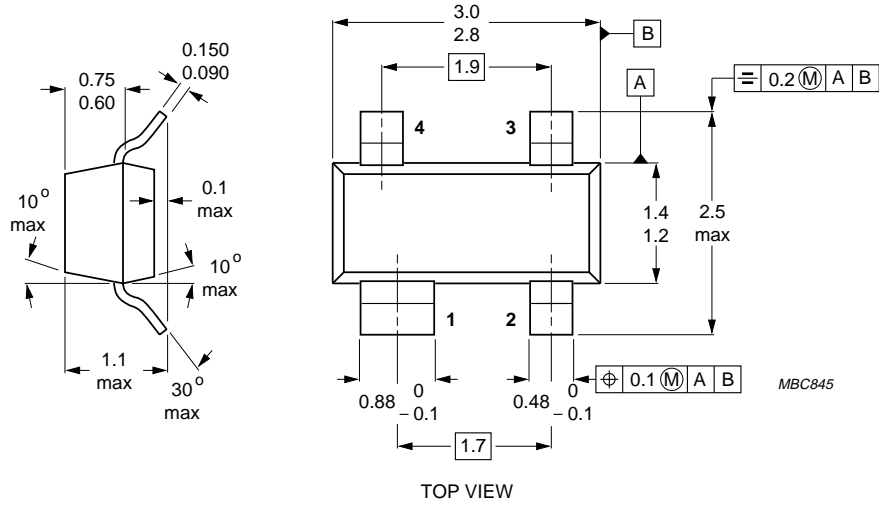
## Note

- Crystal mounted in a SOT103 package.

# N-channel dual-gate MOS-FET

BF991

## PACKAGE OUTLINE



Dimensions in mm.  
See also *Soldering recommendations*.

Fig.3 SOT143.

## Legal information

### Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

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## Revision history

### Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BF991_N_3	20071120	Product data sheet	-	BF991_2
Modifications:	• Fig. 1 on page 2; Figure note changed			
BF991_2	19910401	Product specification	-	BF991_SF_1
BF991_SF_1	-	-	-	-

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